MEMORANDUM

ON THE

ESTABLISHMENT

OF A

CENTRAL FOREST SCHOOL.

BY

D. BRANDIS,

INSPECTOR GENERAL OF FORESTS.

Dated Simla, the 1st September 1877.

SIMLA:

GOVERNMENT CENTRAL BRANCH PRESS.

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THE necessity for establishing a national forest school in India is now generally acknowledged and the measure should no longer be postponed. Forestry must cease to be a foreign introduction, it must become naturalized, before it can be regarded as built upon a safe and permanent basis. To effect this, efficient arrangements must be made to teach forestry in this country.

The area of the demarcated forests, for the good management of which the Department is responsible, is now so extensive that the existing agency is no longer sufficient. Under the Conservator or other Chief Forest Officer of the province this agency consists of the superior staff (Deputy, Assistant and Sub-Assistant Conservators) and the subordinate staff (Forest Rangers, Foresters and Forest Guards). More than one-third of the officers composing the superior staff have received a professional training in the forest schools of France and Germany, and arrangements have been made to recruit its ranks chiefly by the appointment of officers who have received such professional training.

2. The officers of the superior staff now hold in many cases executive charges of extensive forest divisions and sub-divisions; but it will be impossible to continue this system much longer. As the management of these estates is perfected, the area of executive charges must be diminished. Again, the present state and the immediate prospects of the forest revenue prohibit considerable additions to the strength of the superior staff. The executive charge of the forests therefore must more and more devolve upon the officers of the subordinate staff; that is, upon Forest Rangers and the superior grades of Foresters. Considerable progress has been made in several provinces in the establishment of forest ranges or executive charges, and as this system is further developed, the officers in charge of forest divisions will be more and more relieved from executive work, and will be able to devote their time more usefully to inspection and control of the executive officers under their orders.

3. Progress in this respect would have been much greater, if early and efficient arrangements had been made for giving to Forest Rangers and Foresters that professional training which they require for the efficient discharge of their duties. The chief object of the training school now proposed to be formed will be to prepare natives of the different provinces of India for the executive charge of forest ranges. A further object of this institution will be to enable Forest Rangers to qualify for promotion to the superior staff; for, although for a considerable time to come it will be necessary to a great extent to recruit the superior staff by the appointment of Englishmen who have received a professional training in the forest schools of Europe, yet it is most desirable that the staff should be strengthened by the appointment of natives of the country who have received their professional education in India. And eventually forest administration in this country ought to be independent of foreign help, and

this is an additional reason why a commencement must now be made by establishing an institution where professional instruction in forestry can be obtained.

4. The necessity of action in the direction here indicated was urged in a report on the training of natives for the superior appointments in the Forest Department, submitted to the Government of India in July 1869. It will make matters clearer to quote the following extracts from that report:—

Present organization of the department.

PARA. 7. The arrangements for selecting and training young men—natives of this country—will require careful consideration; and before entering into detailed proposals on this subject, it may be useful briefly to review the present organization of the department under the Government of India, and to indicate the direction in which this organization will probably develop in future. I should mention that none of the proposals and suggestions in this report refer to the Presidencies of Madras and Bombay.

At present there are in each province under the Conservator a number of Divisional and Sub-divisional Officers, each in executive charge of a division or sub-division of the forests.

Present forest ranges too extensive.

8. The forest ranges in charge of these officers are so extensive that in most provinces the necessity has been felt to sub-divide them, and to establish under each Divisional Officer a number of executive charges of manageable size. In those State Forest Departments of Europe which are organized in the most efficient manner, the average area of executive forest charges varies from 5,000 to 20,000 acres, or say from 8 to 30 square miles. Forests of this size can be thoroughly kept in hand by an Executive Officer who is resident on the spot, and has the requisite number of subordinates under him for the watching and protection of the forests. But the yield of the forests in India must first increase considerably before the area of executive charges can be reduced to this extent.

Annual yield per acre, small.

9. In Sindh, where the Government forests are more compact than in almost any province of India, I found on my late tour of inspection that on a total area of 317,245 acres the annual yield per acre amounted to about 5 cubic feet, and the gross revenue from 12 to 13 annas per acre. Some of the richer forest tracts, however, yielded as much as from 7 to 14 cubic feet, and from one to two rupees per acre.

And although there are some exceptionally rich and compact forests in other provinces, which under systematic management ought eventually to yield a much larger outturn, such as the deodar forests of Jaonsar Bawur, and the Bhagarutti Valley, some of the sál forests in Oudh, Kumaon, and the Mundla District of the Central Provinces, the bamboo jungles in the Punjab and the fuel plantations now under formation in the plains of that province, still, speaking in a general way, we cannot at present expect a much larger gross revenue from the majority of the Government forests than, say, from Rs. 100 to 200 per square mile of 640 acres. This is necessarily a somewhat vague guess, as the Government forests in a few provinces only have been demarcated and their area determined. In Oudh the area of the State forests is 700 square miles, and the gross revenue may at present be said to fluctuate between Rs. 70,000 and 1,50,000.

Executive forest charges, their probable extent.

10. These figures will make it clear that we can only afford a moderate outlay per square mile on the protection and management of the forests. Plantations and particularly rich forests excepted, the average extent of executive forest charges therefore will probably, in most cases, not be much below 100 square miles.

Again, assuming that an area of 100 square miles may yield an annual gross revenue of Rs. 10,000, it is clear that at the outside not more than from Rs. 2,000 to 3,000 ought to be spent on the establishment entertained for the protection and management of such a forest.

Rates of pay for Executive Forest Officers.

11. On a rough calculation, it seems probable that the pay of these Executive Officers will eventually range from Rs. 50 to 200 per mensem, or Rs. 600 to 2,400 per annum. Under them will be the subordinate officers of the protective establishment, and over them will be the officers of the inspecting and controlling branches of the service.

The formation of this class of Executive Officers or Forest Rangers as they may perhaps most suitably be called, has been commenced in a few provinces; eventually, as the revenue from the forests increases, their numbers will increase also, and, as a matter of course, they will generally be natives of the province in which they are employed.

Organization of Forest Department in India and France compared.

12. It may not be out of place to compare this contemplated organization with that of the department entrusted with the administration of the State forests in France.

The present area of these forests is 1,088,966 hectares, equal to 2,722,000 acres, or about 4,253 square miles. The gross receipts, including the produce of the extraordinary cuttings, and the contributions of the communes and public institutions to cover the cost of the administration of their forests (£52,000), are estimated for the current year at nearly 43 millions of francs, or £1,720,000. This gives about 12*s.* 3*d.* per acre, if the contribution of the communes noted above is deducted. The charges, including extraordinary grants for the planting of barren hill sides and forest roads, are estimated at 13 millions of francs, or £520,000. Of this expenditure, the establishment charges amount to £212,000.

Revenue of forests in India.

13. During the current year, 1869-70, the State forests in the provinces under the Government of India, including those of Mysore and Berar, but excluding Madras and Bombay, are expected to yield a gross revenue of £305,000 against an outlay of £203,000, of which £75,600

will be expended on establishments. In addition to this, there is the charge of £3,600 for the general control of the Department under the Government of India, part of which is chargeable to the forests of Madras and Bombay.

5. Since these remarks were written, great progress has been made in forest administration in the provinces under the Government of India. The area of demarcated forests on the 1st April 1876, the last date to which complete returns are available, amounted to 15,000 square miles, and considerable additions have been made since that date. In 1875-76 the gross forest revenue of the same provinces amounted to Rs. 57,77,000. A large portion of this revenue is realized from forests which are outside the demarcated State forests, but in the State forests also the gross revenue per square mile has greatly improved.

6. The area of the State forests of Oudh is now 824 square miles, and this area yielded a gross revenue in 1875-76 of Rs. 294,658 and in 1876-77 of Rs. 3,35,450 from demarcated forests only, or on an average Rs. 382 per square mile. In the North-Western Provinces, where the forest revenue is exclusively derived from the demarcated and leased forests, the gross revenue during the last six years has averaged Rs. 12,00,000, which on an area, including the estimated area of the leased forests (460 square miles), which are not demarcated, approximately of 3,000 square miles, amounts to Rs. 400 per square mile. Even in the Central Provinces, where the demarcated reserves are surrounded by a much larger area of undemarcated Government forests, which are nearer to the market, and where consequently the reserves are only worked sparingly, an area of 2,332 square miles realized a gross revenue of Rs. 259,661 in 1875-76, or at the rate of Rs. 111 per square mile. It may be confidently expected that a few years hence the average gross revenue of the demarcated forests in none of the provinces to which the present report relates will be less than Rs. 320 per square mile or 8 annas per acre, and that in several provinces it will exceed one rupee per acre.

7. This is a great advance over the figures stated in 1869, and with these prospects before us, it will soon be possible in most provinces to form forest ranges of manageable size. In 1869 it was apprehended that the average area of forest ranges would not be much below 100 square miles. But it is evident that whenever the average gross revenue of a forest district has attained to one rupee per acre, the extent of forest ranges may be reduced to an average of 25 square miles or 16,000 acres, yielding a gross revenue of Rs. 16,000 per annum. These figures permit some conclusions to be formed regarding the staff of Executive Forest Officers that will eventually be required when the average gross revenue of the State forests in the provinces to which this report relates shall have attained to Rs. 640 per square mile. With an average extent of 25 square miles per executive charge, the total area of the demarcated forests, as it stood in April 1876, would demand 600 Executive Officers, and for their efficient control and inspection 100 officers of the controlling staff would be required. In the report from which the above extracts are quoted, a sketch was given of the organization of the French State forest service as it then existed, and it was stated that for the charge of 4,253 square miles of State forests, and of 8,330 square miles of communal forests, a controlling staff of 210 Conservators and Inspectors and an executive staff of 709 Sub-Inspectors and General Guards were maintained. Owing to the loss of Alsace and Lorraine, since the report of 1869 was written, the area under the State Forest Department in France has been diminished, but the general system of organization has, as will be seen from the following data, not been materially changed. In 1876 the extent of the public forests managed by the State forest Department in France was as follows:—

State forests ...	...	2,426,912	acres or	3,792	square miles.
Communal and other public forests ...	...	4,738,767	„ or	7,404	„
Total	...	7,165,679	„ or	11,196	square miles.

In the budget estimate for 1877 the gross revenue of the State forests, not including the contribution of £45,600 paid for the management of the communal and other public forests by the State Forest Officers and excluding the value of forest material used for departmental purposes, is entered as £1,372,987, amounting per acre to 11*s*. 3*d*. and per square mile to £362-1-6. In 1876 the number of Conservators and Inspectors was 215 and that of Executive Officers (Sub-Inspectors and General Guards) 712.

8. If forest administration in the provinces under the Government of India continues to progress satisfactorily, and if the revenue increases to the extent anticipated, the controlling staff must for an area of 15,000 square miles eventually be increased to a strength of 100, and the executive staff to a strength of 600 officers. The present strength, as sanctioned by the Government of India, is as follows :—

Superior staff ...	Conservators on Rs. 1,000 to 1,600 per mensem ...	7	
	Deputy Conservators on Rs. 700 to 900 per mensem ...	30	
	Assistant Conservators on Rs. 250 to 450 per mensem ...	54	
	Sub-Assistant Conservators on Rs. 200 per mensem ...	12	
			103
Subordinate staff ...	Forest Rangers, on Rs. 50 to Rs. 150 per mensem ...	98	
	Senior Foresters, on Rs. 20 to Rs. 40 per mensem ...	229	
			327
	Total officers ...		430

As explained above, a considerable portion of the superior staff is and will for some time to come be employed in executive duties. It is impossible to foretell how these matters will develop, but it is not impossible that in future the controlling staff will consist exclusively of Conservators and Deputy Conservators, and that Assistant and Sub-Assistant Conservators, Forest Rangers and senior Foresters will all hold executive charges.

9. The object of the training school now proposed to be established is to educate natives of this country for the duties of Foresters and Forest Rangers and to enable Forest Rangers to qualify for appointments in the superior staff. But in framing our plans it must be borne in mind that the senior grades of Foresters included among executive officers will to a great extent be recruited from the class of Forest Guards. And though at present men on Rs. 20 and Rs. 25 per mensem are actually in executive charge of forest ranges, this can only be continued in those cases where protection is the chief work. Wherever the management and working of these estates is further developed and where the revenue has sufficiently increased, it will be necessary to place forest ranges under the charge of officers of superior grades.

10. It is evident from these remarks that for many years to come professionally trained men will be required to recruit a portion only of the 327 existing appointments of Rangers and superior Foresters. The present proposals will be based upon the assumption that as a commencement it will suffice to educate 10 candidates annually for this service. The percentage of permanent vacancies among the officers of the superior staff has for several years past been about 5 per cent. annually, and the same figure may be taken for the subordinate staff as likely to cover vacancies by death, resignation, dismissal and promotion to the superior staff. On this assumption 10 candidates annually would suffice to recruit a staff of 200 officers.

11. Before proceeding to explain the manner in which it is now proposed to effect the professional training of these men, it will be useful briefly to review the attempts hitherto made to attain this object. In the report quoted two proposals were made : *firstly*, to organize the subordinate staff in the different

provinces under the Government of India on a definite system, similar to that which has now been adopted; and *secondly*, to select a certain number of apprentices, who should first receive a practical training under selected officers in their own province and would then be sent to Roorkee or any other Engineering College where they would be required to go through a course of studies in mathematics, surveying and the elements of civil engineering.

12. The report was communicated to local Governments for an expression of their opinion, and after fully considering these opinions and the objections raised against the scheme, the Government of India passed orders in September 1871. The first proposal to organize the subordinate staff on a regular system was declined; the second proposal was sanctioned with certain modifications.

13. The following extracts from the report will show what was intended to be done with regard to the selection of these apprentices:—

Selection of apprentices.

PARA. 19. In selecting apprentices certain qualifications should be insisted upon.

In the first line stand a strong constitution and active habits, a good moral character, and a fair amount of general education, especially in arithmetic and elementary mathematics, sufficient to enable him, after he has shown his general fitness for the work of the department, to extend his mathematical studies and to become proficient in surveying, levelling, and the elements of civil engineering.

Arrangements should be made for enabling the more promising apprentices to become proficient in these subjects by going through a course of study either at Roorkee or at some other Engineering College after they have completed two years of practical apprenticeship in the department.

20. For those who aspire to rise to the higher appointments in the controlling establishment, a competent knowledge of English will be indispensable in addition to the other qualifications; but a knowledge of English need not be considered requisite for those who desire to remain within the limits of their own province, and who will be content to rise to the highest grade of Forest Ranger. For such men it will be sufficient that they be familiar with the different languages spoken and written in the forest districts of their own province.

Knowledge of English necessary for the higher appointments only.

But if they desire to rise higher, they should be available for transfer to other provinces, and should be competent to carry on their official correspondence in English.

Organization of executive officers proposed.

21. To carry out these suggestions, two measures appear to me requisite:—

First.—The organization of the appointments of Forest Rangers on a defined plan, which should, as much as possible, be uniform in the different provinces under the Government of India.

The following classification might perhaps be found suitable:—

Forest Rangers, 1st Class.

1st Grade	..	..	..	Rs. 200 per mensem.
2nd „	..	..	..	„ 150 „
3rd „	..	..	..	„ 120 „

This class would comprise a number of men, Europeans and Natives, now employed at these rates of pay under the name of Sub-Assistant Conservators, Darogahs, Foresters and Overseers.

Forest Rangers, 2nd Class.

1st Grade	..	..	..	Rs. 100 per mensem.
2nd „	..	..	..	„ 80 „
3rd „	..	..	..	„ 70 „
4th „	..	..	..	„ 60 „
5th „	..	..	..	„ 50 „

All persons drawing less than Rs. 50 per mensem might be styled Foresters, say, from Rs. 12 and upwards, and those drawing less than Rs. 12 monthly might be styled Forest-watchers or Patrols.

Foresters and Forest-watchers would mainly be employed for the protection of the forests, and Foresters of the superior grades would occasionally be entrusted with the executive charge of small forest districts.

22. This part of my proposals would not entail any additional expense at present: existing appointments would be arranged in accordance with such classification as may be adopted, but new appointments would not be made, except where, in course of time, the expansion of the work might require it.

The appointment and promotion of executive officers to rest with Local Governments.

The appointment, promotion, and all other personal matters connected with Forest Rangers and all other subordinate establishments would, as hitherto, remain under the exclusive control of the Local Government or Administration. Half-yearly lists of Forest Rangers should, however, be submitted to the Government of India, with brief remarks opposite each individual as to moral character, the nature and mode of performance of his duties, and other matters. Although it may not be deemed expedient to publish these appointments in the *Gazette*, the names and charges of Forest Rangers, and the names of apprentices, should be included in the lists of forest officers which are published half-yearly by the Government of India.

Allowances proposed for apprentices.

23. The second proposal would be to create for each province a certain number of apprenticeships, the object being to prepare young men for the executive and controlling branches of the department.

I would suggest two classes of apprenticeships: the rate of their allowances would be a matter for further consideration; perhaps they cannot be fixed alike for all provinces. Rupees 40 for the first, and Rs. 25 for the second class might be found suitable rates in some provinces. It might be considered whether they could be fixed lower; in that case there would be three classes of Forest Rangers instead of two, the pay of the lowest grade being Rs. 30—the rate paid to 4th class Darogahs in Oudh. But I feel doubtful whether a suitable class of men will come forward as forest apprentices if the allowances are lower than suggested above. This, however, is a matter on which the local Forest Officers are more competent to give an opinion.

Apprentices to be selected and promoted by Local Governments.

24. Including Berar, there are eight distinct departments in the different provinces. A number of apprentices, in proportion to the strength of the forest establishments, would be attached to each province in which the system can be introduced. The proportion of men in each class cannot be determined. It should be left to the Local Government or Head of Administration to appoint and to promote apprentices within these classes, to transfer and to dimiss them as circumstances may require. It would, however, be convenient that half-yearly lists of apprentices be submitted to the Government of India, giving brief remarks as to their character, diligence and aptitude for work.

Qualifications of apprentices.

25. A fair amount of general education, as indicated above, should be insisted upon in all cases, and those who have passed the Entrance Examination of the Calcutta or other University might at once be admitted in the first grade. For Burma special tests might be substituted for the Entrance Examination. The selection of apprentices should be the special duty of the Conservator of Forests, who would place himself in communication with the Principals of Colleges and the Heads of District and Village Schools.

It would be premature to suggest the sources from which the candidates should be drawn. Circumstances are very different in the different provinces, and experience alone can show what sources will yield useful men, who can stand the fatigues and exposure of work in the forests, and who at the same time have sufficient intelligence and education to become useful Forest Officers. The age for admission might perhaps be fixed between 17 and 25 years.

Rules for promotion of apprentices.

26. These forest apprentices would at first be placed under an experienced Forest Officer, and would, under his direction, be employed in work connected with the protection and management of the forests.

Government should retain the right of dispensing with their services at any time during their apprenticeship, without assigning any reason. In some cases it may happen that young men on trial are found to be unfit for the work in the forests, and yet likely to be useful for office and account work. In such instances they might be transferred to office establishments, but would in that case have to submit to a reduction of their allowances.

Ordinarily the apprenticeship of these young men might last one year in each grade. Those who are at once admitted to the higher grade would ordinarily serve two years like the others. But the Conservator should have the power in special cases to shorten the apprenticeship, and, when he is not satisfied with the progress of any apprentice, to add a year to the time fixed.

Their studies at an Engineering College.

27. At the close of their apprenticeship, those who by habits, education, constitution and aptitude for the work, appear fit for the executive branch of the department, would then be required to go through a course of studies at Roorkee or at any other Engineering College, the object of which would be to make them proficient in mathematics, including plane trigonometry, in surveying, levelling, plan-drawing, and to teach them the elements of natural science and elementary engineering. The duration and detailed arrangement of this course of instruction may be settled hereafter. Eventually, when some of the forests in the vicinity of Roorkee have been placed under a regular system of management, it will be advisable to establish a forest school in connection with the Engineering College where all apprentices, after having been prepared by two years' practical work in the forests, would be instructed in the system of regular forest management, the framing of working plans for coppice and high timber forests, the arrangement of cuttings, so as to secure the reproduction of the forests, the rules for thinning in forests of different kinds and ages, the aid to be given to natural reproduction by planting and sowing, the principles of forest legislation and those portions of civil and criminal law with which a Forest Officer should be familiar, and in all other matters necessary for the efficient discharge of their duties. But these are suggestions for future consideration. To urge them here would lead to no practical result, as the first conditions for the establishment of a forest school are wanting, and as the importance of these matters is hardly appreciated in the present stage of forest management in India.

Condition for appointment to grade of Forest Ranger.

28. It will, however, I believe, be acknowledged by all who are practically acquainted with the present work in the forests, that Forest Officers should be competent to make a survey and to prepare a map of any forest district or plantation, to take a line of levels through the country, to make forest roads, and to construct simple bridges and rest-houses in the forests. To appoint men to the charge of forest ranges and forest divisions who are not competent in these matters, would almost be equivalent to compelling Conservators of Forests to work without tools, or to make bricks without straw.

At the close of the course at the Engineering College, there would be a pass examination, and successful candidates would be appointed to the grade of Forest Ranger. Should at any time the number of candidates be in excess of the vacancies, a number of supernumeraries would have to be allowed.

32. It is very natural that at the present stage of forest management in India, while the demarcation and protection of the forests against fires, cattle and other injury are undoubtedly the most important operations, the want of a special professional training should not be felt by Forest Officers. But as operations progress, the want of such special training will certainly be felt as a serious disadvantage. As one out of many cases in point, I beg to draw attention to my late report on the Sindh forests. At present the quantity of wood and timber taken annually from these forests is supposed to be considerably below the amount produced, and it is therefore not of much consequence whether the cutting and felling is done on a regular system or not. But let the demand increase, which it certainly will on the construction of the Indus Valley Railway, and great damage will be done, unless each forest is divided into blocks and compartments, and a regular system of working by rotation is established, and unless the cutting and felling is so arranged as to secure the reproduction of the forest, either naturally or by planting and sowing. Such a plan of operations must be framed on the spot by officers who are familiar with that kind of work. The quantity and description of the growing stock, the quality of the soil in each block or compartment, and all other circumstances, which affect the growth of trees and coppice-woods, must be examined, and in arranging the felling operations for a succession of years, the supply of labour, the lines of export and the demand for forest produce must be carefully considered.

Necessity of professional training.

33. These are all very simple matters in themselves, yet it is impossible to frame any general set of rules which would guide a person not experienced in such operations. We are as yet very imperfectly acquainted with the habits of our principal forest trees as regards the amount of light and shelter they require in different soils and under different circumstances of elevation, aspect of the slope and climate; all our operations therefore are as yet of an experimental nature; but it is indispensable that these experiments should be in the hands of men who are familiar with the modes of treatment under which forests in other countries are found to prosper and to yield a considerable and permanent revenue.

Benefit to be gained from experience in other countries.

We do not expect Foresters from Europe immediately to apply their experience and practice to the forests of this country. On arrival, all have to go as it were through a new apprenticeship; they must first become familiar with the requirements of climate and the peculiar vegetation of this country, but if they have been well trained in the principles of their profession, they will be able to adapt their past experience to the new circumstances of vegetation and climate. Their experiments will be in the right direction, and knowing what the objects of rational forestry are, they will be able in time to devise the best means for attaining them.

14. It was proposed that 20 apprenticeships should be sanctioned and that they should be distributed among the different provinces. In the orders quoted, of September 1871, the Government of India sanctioned 12 apprentices, *viz.*, three for the North-Western Provinces, three for the Punjab, three for British Burma and three between Oudh and the Central Provinces. Their allowances were fixed in two classes at the rates proposed, *viz.*, at Rs. 40 for the first and Rs. 25 for the second class.

15. The experience of this arrangement during the six years of its existence has shewn that, though it has furnished a few good men, the results have not been what was desired and anticipated. The history of this experiment need not here be reviewed in detail; it will suffice to say that in some cases the selection of the apprentices was not made with sufficient care, and that where good men had been selected and trained, no suitable vacancies in the regular staff were available for them, and thus many of the candidates continued as apprentices year after year, doing the work of Forest Rangers, but not making room for fresh men to be taken on in their place. Two proposals had been submitted in my report of 1869, which were intimately connected; but of these two proposals one only was accepted, the other, which formed the basis of the entire scheme and was a necessary condition of success, *viz.*, the systematic organization of the subordinate establishments, was not carried out. Apprentices were selected, but sufficient appointments were not available for those who had completed their apprenticeship.

16. But even if a systematic organization of the subordinate establishments had been effected when the selection of apprentices was sanctioned in 1871, there were other insuperable obstacles to the success of the scheme. Under the circumstances as they then existed and as they still to a great extent continue to exist, Divisional Officers were and are overworked. The selected apprentices, therefore, instead of being instructed in their profession, were frequently employed as a welcome help in the work of the division; and thus the expressed object of the scheme, which was to train Forest Rangers, was lost. Again, though the intention was to train men as Forest Rangers, the arrangements made tended more in the direction of recruiting the superior than the subordinate staff. Men, who as apprentices draw an allowance of Rs. 40 per mensem, naturally look forward to appointments beyond the rates of pay fixed for Forest Rangers.

It was hoped that the high rates then fixed would attract the sons of native gentlemen, young men of good family and education. These hopes have only been realized in a few cases. None of the apprentices selected under the orders of 1871 has yet been found fit for promotion to the superior staff.

17. The experience gained points to this conclusion that if it is intended to prepare apprentices for the appointments of Forest Rangers and Foresters, their allowances must be fixed at lower rates. This was felt in the North-Western Provinces, and a modified plan was proposed in 1875 by Mr. Greig, the Conservator. The main features of this plan were that the Conservator should select young men of respectable families, related, if possible, to good men already in the forest service and should send them to Roorkee to be educated in the lower subordinate class of that College; that Government should advance each of them Rs. 10 a month during the time they were studying at Roorkee; that this advance should be repaid by the young men by monthly instalments during the first two years of their service in the Forest Department, and by their parents or relations in case of their dismissal, resignation or unauthorized absence from duty; and that, on the other hand, Government should incur the loss in the event of any of the young men dying or becoming incapacitated by sickness. These proposals were sanctioned on condition that not more than five candidates be selected each year, and that the system of employing apprentices sanctioned in September 1871 be gradually discontinued in the North-Western Provinces.

And quite lately, in the Central Provinces, when the transfer of the unreserved forests to the Forest Department rendered urgent the strengthening of the class of Forest Rangers and Foresters, Captain Doveton, the Conservator of Forests, proposed to devote certain savings in subordinate forest establishments to the entertainment of apprentices, the average rate of allowance being Rs. 15 per mensem, and his proposals received the sanction of the Government of India.

18. In some cases, however, the large allowances paid to apprentices were undoubtedly useful in securing the services of good and useful men for the superior grades of Forest Ranger. When, as already stated, a short time ago, the Forest Department in the Central Provinces undertook the charge of the unreserved forests in addition to the reserves, and when it became necessary to consider measures for making the staff of Forest Rangers more efficient so as to utilize them in the additional work thrown upon the Forest Department, the Conservator came to the conclusion that he could not yet do without apprentices on the higher allowances sanctioned in 1871.

19. Another objection to the arrangements of 1869 was pointed out in an able report furnished to the Bengal Government in October 1873 by Dr. Schlich, the Conservator, of which it will be useful to quote the following extracts:—

PARA. 17. The system of training requires a great deal of consideration. Dr. Brandis, the Inspector General of Forests, drew up a report on the subject dated 6th July 1869, and the Government of India in their Resolution in the Department of Revenue, Agriculture and Commerce, No. 90, dated 31st July 1871, sanctioned part of his proposal, which was to the effect that a number of apprentices should be appointed, possessing a fair amount of general education, those who had passed the Entrance Examination of the Calcutta or other University being preferred. It was ordered that the apprentices should first receive a practical course of training for two years under an experienced officer; and that those who should then appear fit for the executive branch of the Department should be required to go through a course of studies at Roorkee, or at any other Engineering College, after which they would be appointed to the Forest Department as vacancies occurred. Dr. Brandis stated also that eventually it would be advisable to establish a forest school in connection with the Engineering College at Roorkee, where all apprentices after having been prepared by two years' practical work in the forests, would receive instruction in the systems of regular forest management.

18. . Consequent on the above Resolution, the Government of India in their letter No. 133, dated 18th January 1873, sanctioned certain arrangements made between the Principal of the Roorkee College and the Conservator of Forests, North-Western Provinces, to the following effect:—

1st.—Any of the apprentices who after two years' service in the forests show a fitness for the work, shall be sent to the College for either one or two years.

2nd.—The Conservator may indent on the College for any men he may require.

3rd.—The Conservator may send to the College any promising young men, the sons of forest employés.

4th.—No special class need be formed for the Forest Department, but the men sent to the College will be put into such a class as their previous training fits them for.

19. The system proposed and partly sanctioned is to the effect that the apprentices shall have a fair amount of education, then go two years into the forests, and then begin to study again in order to enlarge their knowledge of mathematics and other subjects. I do not approve of this arrangement, because the apprentice during his two years in the forests is quite sure to forget a great portion of the theoretical knowledge he possessed, and on re-entering school or college he will have to begin again to relearn what he has forgotten, to enable him to proceed further. Moreover, it is very difficult always to select, to conduct the practical training, officers who have a sufficiently broad view on forest matters, to prevent the apprentices adopting the personal views of their first instructor to such an extent that future theoretical training never rectifies their leaning towards them. On the other hand, if the broad principles of forest management are taught first, the apprentice will go to the practical part of his training with a judgment of his own, and he will be able to understand and learn the practical work in a much shorter time, than if he comes into the forests without the theoretical knowledge to guide him. Against this view it is generally brought forward that the apprentice will not understand the theory without the practice, but I do not think the objection will hold good, because it is disproved in almost all other branches, *e. g.*, engineering. Besides, the theoretical study will have to be closely accompanied by a course of practical demonstrations in the forests nearest to the college.

20. Another reason for the proposal of having the practical training first and the theoretical afterwards; is, to see whether the apprentice shows fitness for the work. Now, I think, this objection will have to be abandoned as well. No doubt it can be found out, whether the apprentice will become fit for works of a certain standard; but it will leave the question, whether he will be capable of passing successfully through the theoretical course, and becoming an officer of the standing we require, unsolved: whereas a man who has passed through the latter successfully may reasonably be expected to be able to carry his knowledge into practice. There is only one weak point in the course I propose, and that is the question whether the apprentice will take kindly to working in the forests. But I think the cases in which this question has to be negatived will be less in number than those in which apprentices, who have gone through their practical course first, will be found incapable of passing successfully through their theoretical course. To sum up, I am decidedly of opinion that the theoretical training should be gone through first and the practical course afterwards.

21. It has been estimated above that if a system likely to lead to beneficial results is adopted, we shall have 20 pupils under theoretical training, not counting those who may be required for the Madras and Bombay forests. Under these circumstances I consider that the time to form a special forest class in connection with some college has come, and as there are forests close to Roorkee which can be made available for practical demonstrations, that college will perhaps be better adapted than any other.

22. It will be useless on my part to enter upon a detailed discussion of the course of study, since my proposals entail a change in the organization which may or may not be adopted. I shall, however, shortly indicate my ideas. The apprentices should be selected in the different provinces according to requirements; the number to be fixed annually. They should either have passed the Entrance Examination of the Calcutta or any other University, or pass a special examination in similar subjects. The age might be fixed between 17 and 22 years. As a matter of course, a strong constitution, active habits, and a good moral character will be indispensable. The men selected should be sent for a course of two years to, say, Roorkee, to be instructed in mathematics, including plane trigonometry, surveying, levelling, and plan-drawing; the elements of natural sciences, especially botany; elementary road-making and building; and forestry. The different courses should be so arranged that forestry takes up the greater share of the second year, and the other branches chiefly the first year. The course in forestry should comprise all the different branches, such as the treatment of forests generally, the formation of forests, forest protection, forest utilisation, preparation of working plans and so on. All the different forest operations should be demonstrated in a forest range close to the college, which should be taken under special management for the purpose; and during the vacations, tours through neighbouring forests should be undertaken. At the end of every six months, the apprentices should be reported on, and those whose exertions and progress are not satisfactory, be liable to be removed from the class. At the end of the two years they should have to pass an examination in the several branches. If successful, they should return to the provinces they came from in order to enter upon a course of one year under experienced officers, usually executive, whose duty it should be to introduce them to actual work in all its branches. At the end of the year the Conservator of Forests should satisfy himself that the apprentices have acquired a sufficient store of practical knowledge to conduct the management of a range. Those who have not succeeded in this should have to go through a second practical course, but if finally passed by the Conservator they should be appointed Rangers as vacancies occur, and in the meantime receive apprentice allowances and be usefully employed.

23. The formation of a forest class at Roorkee, or some other college, will, of course, entail the appointment of a Professor of Forestry, and this raises the question of the expenditure necessary to carry out the scheme. It appears to be acknowledged that apprentices will not be forthcoming unless a certain allowance is made to them, which has been fixed between Rs. 25 and 40 per month. I think Rs. 25 ought to be sufficient to ensure good men coming forward. If this view is correct, the annual allowance for 30 apprentices would amount to Rs. 9,000. To this should be added the Professor's pay, amounting to (say) Rs. 12,000 per year, and for general expenses (say) Rs. 4,000, making a total of Rs. 25,000, or Rs. 833 per Ranger appointed. I need hardly say that this amount may be considered as insignificant, when the great amount of good which the proposed measure is sure to do in our forests, is taken into consideration. Besides, I am quite convinced that the organization here proposed will over and over again repay any extra expense incurred.

The suggestion that the theoretical training should precede the practical apprenticeship, has much to commend it; the difficulty is that much time and money may be wasted on the theoretical education of young men who are afterwards found to be quite unsuitable for the hardships and exposure of forest life.

20. It has been the wish of the Government of India, repeatedly expressed, that the Civil Engineering Colleges should not only be utilized to give theoretical instruction to apprentices who have previously gone through a practical training in the forests, but that Conservators should indent on these colleges for suitable men to fill appointments of Forest Ranger. Attempts have been made by Conservators, especially in the Provinces of Northern India, to avail themselves of the excellent instruction imparted at Roorkee, in order to obtain a more useful class of men for the appointments of Forest Rangers. The result has not hitherto been satisfactory. It will suffice to quote the following extracts from a report by Mr. Baden-Powell, submitted to the Punjab Government in April last, in order to illustrate the difficulties experienced in this respect :—

PARA. 4. As a general rule it is my experience that the Roorkee men are not well suited to our work. They generally come up with ideas which in the popular phrase make them "above their work," and they get discontented as a necessary consequence. The Roorkee training giving no idea of a *Forester's* work, but being directly fitted to produce Draftsmen or Overseers for Engineer's offices, as soon as the employés find that forest life is very different to this, they dislike it. I have now a Roorkee apprentice, who comes to me disconsolately with a roll of drawings showing how he can "letter" and margin maps with ornamental capitals, and how he can indicate local features on a map by minutely penned or tinted marks, and asks me to allow him to return "to his profession," which means that he wants to be a draftsman in an office. Yet he gets Rs. 40 pay—a salary to the full what he is worth.

Roorkee men generally unsuited to our work.

They are trained to be Draftsmen and Overseers.

Instance of this.

5. I confess that as far as my opinion goes I do not see that, except for a knowledge of surveying (which is *one small part* of a Forester's requirements) the Roorkee candidates are in any degree superior to others. For my own part, unless we can have real forest training I much prefer to secure *respectability* to surveying. The sons of respectable people, officers of our native army and others, and men recommended (and practically to some extent guaranteed) by our native gentry, are to me a very much more useful class than Roorkee students, who come up, as I have said, often unconnected with the Punjab, with no family reputation to maintain, puffed up with pride at their accomplishments, and grumbling at every rate of pay which it is practicable to offer them.

Men sent up do not prove superior to untrained men.

* * * *

10. On the whole question I am very strongly of opinion that a central school of real forestry, with an instructive area of forest attached to it, is *the only* practical solution to the matter.

Want of a central school of forestry.

11. I do not undervalue the excellent work of Roorkee, still less the care and courtesy of the Principal, Major Lang, R. E., who has had the most to do with arranging for training our men.

Roorkee work not undervalued.

But at the very best the Roorkee classes were only a makeshift: they could not, and did not, attempt anything more than what was *one small* part of even a subordinate Forest Officer's education, and the result was that the recipients of the training were simply "disforested" by the process.

The classes are essentially for the Public Works service and designed to produce Overseers, &c., and having done so for so many years, men going there come away imbued with notions that they must get Overseer's, or Draftsman's work, and they are discouraged at having to plant and to sow; to fell, log and launch; to see after rafting and classify timber in depôts.

Classes designed for a special purpose turn out students with a taste fixed in that direction.

And in the North-Western Provinces the Conservator has lately suggested that the apprentices selected under the plan sanctioned in 1875 should in future not be sent to the Thomason College but should be instructed instead under the control of the Superintendent of Forest Surveys.

21. These preliminary remarks it was necessary to make in order to state the measures hitherto taken in this direction and the chief causes of the failure of these measures; and in order to illustrate the difficulties which must be overcome in this business.

The plan now submitted is different. It is proposed to set apart a number of forest districts in a central position, under a separate Conservator, to serve as model forests, and to be utilized for the instruction of candidates for appointments to the class of Forest Rangers and the superior grades of Foresters. The forest districts most suitable for this purpose are those which form the western portion of the charge of the Conservator of the North-Western Provinces. They are the forests situated in the Meerut Division, and the leased forests of the Native State of Garhwal, including those leased forests of the Bussahir State, which are situated on the head-waters of the Pabar and

Rupin rivers, both tributaries of the Tons and contiguous to the leased forests of Native Garhwal.

22. As at present organized the area comprises three forest divisions the Dehra Dún, Jaunsar and Bhágirathi, and the receipts and charges of these divisions during the last six years from 1870-71 to 1875-76 have been as follows :—

Statement of Receipts and Charges of the Dehra Dún, Jaunsar, and Bhágirathi Divisions, in the North-Western Provinces, from 1870-71 *to* 1875-76.

Divisions	1870-71.	1871-72	1872-73	1873-74	1874-75	1875-76.
	RECEIPTS.					
	Rs	Rs	Rs	Rs	Rs	Rs
Dehra Dún ...	31,943	90,819	90,233	78,270	81,905	67 ·21
Jaunsar ...	36,589	1,28,891	3,23,835	5,12,336	2,62,017	2,22,247
Bhágirathi ,,	15,451	5,21,924	6,94,013	4,66,591	2,84,376	1,00,480
Total Receipts ...	83,983	7,47,634	11,08,081	10,57,197	6,28,198	3,90,248
	EXPENDITURE. A, ON ACCOUNT OF CONSERVANCY AND WORKING					
Dehra Dún ..	23,104	30,076	22,590	28,326	25,451	10,796
Jaunsar .	1,41,404	2,22,579	3,01,832	2,47,608	1,76,170	1,44,564
Bhágirathi .	2,18,893	4,43,536	4,12,035	4,10,643	3,80,079	69,940
Total A ..	3,83,401	7,05,191	7,38,457	6,86,637	5,81,700	2,25,290
	EXPENDITURE B, ON ACCOUNT OF ESTABLISHMENTS					
Dehra Dún ..	22,459	19,501	23,695	20,805	22,504	14,685
Jaunsar ...	12,321	35,220	33,031	23,873	16,741	22,013
Bhágirathi	12,544	17,014	13,394	13,459	14,307	14 [illegible]
Total B ..	47,324	71,735	71,023	58,137	53,552	52,297
Grand Total of Expenditure ..	4,30,725	7,76,926	8,09,480	7,44,774	6,35,252	2,77,587

The averages have been—

			Rs.
Receipts	...	...	6,69,223
Charges ..	A 5,53,446 / B 59,011	...	6,12,457
		Surplus ...	56,766

23. These figures comprise the receipts and charges on account of the preparation and carrying to Delhi and Agra of upwards of a million and a quarter of deodar sleepers delivered to the Rajputana Railway. These large timber transactions have yielded no surplus in these divisions ; nevertheless these forest districts have been self-supporting during the period in question and

may, with timber operations on a moderate scale and better prices, be made to yield a very considerable annual surplus.

24. These forests present a great variety of vegetation. In the Dún and Sewaliks there are large extents of Sâl, bamboo and mixed forest with a considerable area capable of producing Sissoo and Khair. In the hills there is a considerable area containing Deodar in addition to vast extents of forest of Oak, Spruce and Silver fir and of *Pinus longifolia*. In the British districts of Saharunpur, Dehra Dún and Jaunsar, the forests are completely demarcated, a portion is free of all rights and privileges, and where rights exist they are clearly defined. The area of the demarcated reserves in these districts is 561 square miles in the Dún and Sewaliks, of which about 70 square miles are closed forests, free of grazing and other rights and privileges; and 145 square miles in the hills of Jaunsar, of which 50 square miles are closed excepting to the cattle of a limited number of villages, who graze in these forests. A considerable area of these forests in the hills and in the Dúns has for several years past been continuously protected against fire, and under the protection against cutting which the greater portion of the Dehra Dún Government forests have enjoyed since 1863, extensive areas have grown up into compact masses of poles which will soon admit of regular treatment.

25. Though it cannot yet be said that there is sufficient demand for all the produce that might be exported, yet the demand is increasing steadily; and there is one portion in the forests situated in the vicinity of Chakrata, which are and must be worked to the full extent of their capabilities in order to furnish fuel and building wood for that station. A preliminary plan of operations for those forests has already been prepared and a regular working plan must ere long be made.

26. These forests in the vicinity of Chakrata have the great advantage, that they are stocked with species of oaks and coniferous trees, which in their characters, their mode of growth and their requirements, are similar to most of the trees with which the forests of France, Germany and Great Britain are stocked. The experience gained in the management of the forests in Europe therefore can with a few modifications be applied to these forests and it will be possible to prepare regular working plans at a much earlier period than this can be done for forests stocked with trees, the mode of growth and requirements of which are widely different from those which we find in Europe.

The same remark as regards the species of tree applies to the deodar producing tracts in other parts of Jaunsar and the leased forests of Garhwal and Bussahir. Here the demand for deodar timber is sufficient to require the entire legitimate annual yield of these forests, and the same general principles that rule the management of coniferous forests in the Alps of Europe must here be observed, with that important difference that the demand is as yet limited to the timber of one species only, the growth of which therefore must by all possible means be favoured and promoted.

27. Plantations, on an extensive scale, of oaks and coniferous trees have been commenced in Jaunsar and at Chakrata, and have already met with considerable success. The Forest Officer who has received his professional training in the State forests of Europe will find himself at home in the hill forests here described, and will be in a position at once to apply the principles which he has learnt and the skill which he has acquired.

28. Finally, the arrangements made in these hill forests for the transport of timber are on a large scale; they have been made with great skill and they are most instructive.

29. These three forest divisions it is proposed to place under a separate Conservator, who will be the Director of the Training School and will, whenever practicable, also be the Superintendent of the Forest Survey Department. Captain Bailey, the present Superintendent of the Forest Survey, is eminently fitted for the post of Director of the Forest School and Conservator of the School Forests, and if Government decide to carry out the scheme as here proposed, there is every prospect of success at the outset under Captain Bailey's direction.

30. There are other forests in the provinces to which this report relates, which may eventually be fitted for the establishment of training schools, but none ready for it at the present time, none so conveniently situated and offering as many other advantages as the forest districts here proposed. There are the forests of the Darjeeling and Jalpáiguri districts both in the Terai and in the hills, which have lately been divided into five divisions of manageable size and are nearly all demarcated, aggregating at present 546 square miles but likely to be much increased. Of the area at present demarcated, about 56 square miles are hill forests consisting chiefly of Oaks, Chestnuts, Magnolias, Maples and Laurels; about 50 square miles consist of mixed forest of the Terai and lower hills up to an elevation of 3,000 feet, and the remaining 440 square miles are Sâl, Sissoo and Savannah forests in the Terai, lower hills and valleys. There is a large demand for Sâl and Sissoo, and it is reported that over a large area of the hill forests the demand will shortly be equal to the legitimate annual yield. But the following figures exhibiting receipts and charges during the last three years show that the transactions are yet on a small scale, and that the forests are not yet self-supporting:—

Statement of Receipts and Charges of the Darjeeling and Jalpáiguri Divisions in Bengal from the year 1874-75 *to* 1876-77.

Divisions	1874-75	1875-76	1876-77
	RECEIPTS.		
	Rs	Rs	Rs
Darjeeling	50,761	66 294	55,464
Jalpáiguri	19,785	10,174	15,534
Total Receipts ..	70,546	76,468	70,998
	CHARGES. A, ON ACCOUNT OF CONSERVANCY AND WORKS.		
Darjeeling	19,584	25,506	35,054
Jalpáiguri	14,436	22,825	37,036
Total A ..	34,020	48,330	72,090
	CHARGES B, ON ACCOUNT OF ESTABLISHMENTS		
Darjeeling	10,390	12,433	20,433
Jalpáiguri	9,077	11,586	17,690
Total B ...	19,467	24,019	38,123
Grand Total of Expenditure ...	53,487	72,349	1,10,213

The averages of the three years 1874-75 to 1876-77 inclusive are—

		Rs.		Rs.
Receipts	...	...	...	72,671
Charges ...	A 51,490			
	B 27,203	...	...	78,683
		Deficit	...	6,012

31. Sir Richard Temple, when Lieutenant-Governor of Bengal, contemplated the establishment of a local forest school in these districts; and explained the objects of this institution and the principles upon which its organization should be based in an admirable Minute, dated 9th October 1876, which was circulated by the Government of India for the information of local authorities in all provinces, and which will be found printed in an appendix to the present report. But this Minute only contemplates the formation of a local school in Bengal and assumes that a higher school will be established by the Government of India, to which a limited number of the most promising candidates from Bengal may eventually be sent.

Local schools will doubtless eventually be formed in several provinces, but it is necessary to make a commencement, and the forests of the Meerut Division, and the leased forests contiguous to them, are most conveniently situated and otherwise most suitable to make such a beginning.

32. There are in the Central Provinces a few forest districts on the hills south of the Nerbudda valley, which will eventually be suitable for the establishment of a training school. Many forest districts in the Central Province have the great advantage of having been continuously protected against fire for a long series of years, much longer than the forests in any other province. This is a great point in their favour, for here apprentices can be taught on the ground the effects of fire conservancy on different descriptions of forest. But with few exceptions these reserves are situated at a considerable distance from great centres of consumption and from the open country and have difficult lines of export; and they are often surrounded by large belts of unreserved and private forests which supply the neighbouring country with wood, bamboos, grass and other forest produce. Moreover, these forests are as yet very imperfectly stocked with the more valuable kinds of timber; for, before being handed over to the Forest Department they had been exhausted chiefly through the reckless cuttings that were caused by the construction of railways, and most of the timber they at present contain is young. Besides protection, therefore, and fire conservancy not much work can be done, and all operations will for years to come be scattered over extensive areas. But what is wanted for training forests most of all is, that instructive work should be concentrated on a small area. Nevertheless in course of time, when they have grown up, and when the demand for forest produce shall have developed, some of the forests near the Nerbudda valley will probably be among the most instructive forests of India, and will be most suitable for the establishment of a local forest school.

33. In the Punjab, there is the Bias Forest Division which, with some of the plantations in the plains, will form an admirable ground for the establishment of a training school. Here the chief obstacle against a commencement being made at once is, that the forests are not yet demarcated, and that it is not expedient nor useful to employ apprentices in districts where the forest property of the State has not yet been finally separated from the private lands, and where the rights of the people in the forests have not yet been defined.

34. I cannot do better than quote the following extract from a late joint report on the forests of Kulú written by the Inspector General of Forests, the Conservator of the Punjab and the Deputy Conservator of the Bias Division :—

PARA. 76. A great variety of work has been proposed in the present report for the organization and improvement of the forests in Kulú, and after the demarcation has been completed, and the art of deodar-planting has emerged from the experimental stage to that of settled practice, this division may be used for training apprentices for the posts of Foresters and Forest Rangers in the Punjab Forest Department.

Besides the regular plantation work, there will be extensive operations for the improvement of the forests, by thinning and otherwise Roads and bridges will have to be made, slides and other works undertaken to facilitate the transport of timber, and, generally, a great variety of instructive work will be carried on in this division. At the same time the demand for deodar, and probably also for other kinds of timber, is certain to increase, so that eventually the revenue produced by this division will justify the maintenance of a strong staff of superior officers, who may be utilized to teach apprentices.

These advantages have strongly impressed themselves on our attention while examining the forests and discussing their management, and we have repeatedly considered whether we should not at once recommend the establishment of a forest school for native apprentices for the Punjab in the Bias division,

assisted by the excellent opportunities for learning which the plantations in the plains afford. We have, however, come to the conclusion that it would be premature to entertain this plan at present.

Demarcation work is not at all suitable for the education of apprentices, and in the matter of deodar-planting, we must still expect a succession of failures before a settled practice and its application to the varying circumstances of each locality has been established.

It would be worse than useless to teach these apprentices their profession by making them share in a succession of failures, and the unsettled state of forest organization, and the doubts regarding the extent to which the rights of the people may be exercised, which are quite unavoidable in forests in which demarcation has not been completed, would, in our opinion, render it inexpedient, at present, to use the Kulú forests for the training of apprentices. At a future—and we hope at no very distant—time, when demarcation is completed and the art of planting deodar is thoroughly understood, the Bias forests will be peculiarly suitable for this purpose.

35. To recapitulate, the chief reasons why it is now recommended to make a commencement in the Dehra Dún and adjoining divisions are:

1.—Sufficient extent of demarcated forest of great variety, much of which has been protected for a long series of years, and in portions of which the demand is equal to the material which can be produced.

2.—The financial importance of these forests and the instructive arrangements for the transport of wood and timber.

3.—A considerable extent of coniferous and oak forest, the treatment of which must be similar to the treatment of forests in Europe.

36. But there are other advantages besides. Hindustáni is understood and spoken by the subordinate Forest Officers in the Punjab, Ajmere, the North-Western Provinces and Oudh, part of Bengal, the Central Provinces and Berar. Many of the candidates who will be sent up for training will probably have some knowledge of English, but it will certainly at the outset not be desirable to insist on such knowledge, and the Dehra Dún and adjoining forests are centrally situated for all provinces in which Hindustáni is the ordinary language of business for subordinate Forest Officers.

Should candidates be sent to the school from Eastern Bengal, Assam, Burma, Mysore and Coorg, they should either be acquainted with Hindustáni or English; this will be an inconvenience, but it cannot be helped, and the arrangements here proposed will at least obviate the language difficulty for as many provinces as possible.

37. Another advantage is that the Forest Survey Department has at present its recess quarters at Dehra, and that for many reasons it is desirable to maintain this arrangement. When demarcation has made sufficient progress in Burma, to render an accurate topographical survey of the reserves necessary, then a portion of the forest survey staff will be transferred to Burma for a series of years, if not permanently. But in order to enable the forest survey to render efficient aid in all provinces where its services may be required, it must always have fixed head-quarters and a place where the maps and records relating to the forest reserves of all provinces can be kept, and for this purpose no place is more convenient than Dehra. Hence the proposal, at the outset at least, to unite the Office of Superintendent of the Forest Survey to that of Conservator of the Training Forests and Director of the Forest School. It is necessary that all candidates for Forest Rangerships trained at the school should acquire a certain proficiency in surveying, and it will be a great advantage to them in their future career if they acquire that degree of proficiency which is laid down for the higher standard. The combination of the forest school with the forest survey in the manner indicated will make it possible to provide efficient instruction in surveying.

38. Some arrangement must be made to provide instruction during the rains in the elements of botany, of geology and other natural sciences. The arrangements needful to effect this object will be facilitated by the vicinity of the Saharanpur gardens and the Thomason College at Roorkee.

39. Under these circumstances there can be no doubt that the Dehra Dún and adjoining forests are most suitable to make a commencement, and it will now be necessary to consider the manner in which the scheme here proposed shall be carried out.

It has already been stated that it is proposed to form one Conservatorship of the three present divisions, Dehra Dún, Jaunsar and Bhagiráthi. The Conservator's head-quarters will be Dehra, and he will be subordinate to the Government of the North-Western Provinces.

40. At present the forests under the Government of the North-Western Provinces and Oudh are under two Conservators,—one having the eastern portion in Gorakhpur, Oudh and the Bareilly district, while the other has the western portion comprising the forests in the Kumaun, Jhansi and Meerut Civil Divisions with the leased forests of Native Garhwal and those in the Bijnour district of Rohilkhund. This is an exceedingly extensive charge, and both as regards the present revenue and the improvement of the forests, it would, in my opinion be better, after the formation of the school forests with the limits here indicated, to confine the other Conservator's charge to the Kumaun and Garhwal forests including those of Ranikhet and Naini Tal with the Government forest lands in the Bijnour district and the Jhansi division. Under this plan there would be three Conservators under the Lieutenant-Governor for the eastern, central and western forests, the last-named being those assigned to the forest school. But if this view should not be accepted, then the next best arrangement to make will be to have two Conservatorships, the eastern and central forests being under the control of one Conservator. The proposals of the present report will be based on the assumption that there will only be two Conservators for the forests in Oudh and the North-Western Provinces.

Under all circumstances the school forests must be in charge of a separate Conservator, who must be directly subordinate to the Government of the North-Western Provinces.

41. The staff of superior officers under the Conservator mentioned for the North-Western Provinces (not including Oudh) consists of 4 Deputy and 7 Assistant Conservators. Of this staff 5 officers have always permanently been attached to the divisions here named, *viz.*, 2 to Jaunsar, 1 to Bhagiráthi and 2 to Dehra Dún and Saharunpur. In addition to these, one officer has frequently been attached to the Jaunsar forests whenever the work was heavy. Under all circumstances therefore will it be possible to assign 5 and perhaps 6 Deputy and Assistant Conservators to the school forests from the staff of the North-Western Provinces. In order to make the management of his forests more efficient, the Conservator of the school forests will find it necessary to establish five divisions, by making the forests in the vicinity of Chakrata one and the Saharunpur forests another separate and additional division directly under the orders of the Conservator. In addition to the five divisional officers who will thus be required, there must be two officers to spare, for it is essential that the staff of the school forests should be strong and should always be kept up on its full strength. These two additional officers have not been provided for in the reorganization which was sanctioned in October 1876, and their pay and travelling allowances will form the chief additional charge which the establishment of the forest school will entail. But in the hope that it may be possible to obtain six superior officers from the staff sanctioned for the North-Western Provinces, the appointment of one additional officer only will at present be recommended, and he should be a Deputy Conservator on Rs. 500 per mensem.

Some increase will also be required in the class of Forest Rangers. For all Government and leased forests in the North-Western Provinces there are only 4 Forest Rangers, *viz.*, 2 on Rs. 70 and 2 on Rs. 50 per mensem. More than 2 of these cannot be spared for the school forests, and this will not be sufficient. There must at least be one Forest Ranger for each division, and the following staff of Rangers is the smallest that can be proposed as a commencement:—

				Rs.
One Ranger on Rs.	100	...	...	100
„ „ „	70	...	...	70
Three Rangers „	50	...	...	150
		Total 5 Rangers	...	320

Deducting Rs. 120, the pay of one Ranger on Rs. 70 and one on Rs. 50, the additional charge will be Rs. 200 per mensem.

42. The staff of the forest survey consists at present of one Assistant and one Sub-Assistant Conservator under the Superintendent. On the establishment of the forest school the Superintendent will not be able as hitherto to devote his entire time to the forest survey, and it will be necessary to appoint an additional officer. This however need at the outset only be a Sub-Assistant Conservator, who can be provided from the sanctioned staff. It is intended that this officer shall remain at head-quarters to superintend the work of preparing maps for the different provinces and to attend to requisitions from Conservators. He may also have charge of the library and the collection of woods and other forest produce which must be established in connection with the forest school.

43. It is necessary that the management of the forests attached to the school be brought to as high a state of perfection as possible, so that they may be real model forests. Their working must be regulated by plans of operations. A regular working plan must, as already indicated, some time hence be framed for the Deoban Working Circle and in the other forests operations must be regulated by annual or preliminary working plans. Until considerable progress in this direction has been made, the value of these forests as training ground for operations will be small. In order to perfect their management some of the best of the younger professionally trained officers at the disposal of the Government of India should be placed on the staff, and in order to make up for the loss of professionally trained men in those provinces from which the officers to be placed on the staff of the forest school will be selected, it will be necessary to ask Her Majesty's Secretary of State to select two additional candidates for training in France. The transfers and exchanges of officers which will be requisite cannot of course be effected at once but will require some time.

44. After the superior staff has been completely organized, it will then be necessary to take a further step, in order to secure efficient professional supervision over the working of the forests in question. For this purpose a Board of Inspection will probably have to be established, consisting of the Inspector General of Forests and two other senior Forest Officers appointed by the Government of India, of whom one should always be a Conservator. Annual inspections should be made, for which spring and autumn would probably be the most suitable seasons, and it will be most convenient to take up one or two divisions annually. The object of these inspections will be: to examine on the spot the plans of operations that have been made, whether they be annual, preliminary or regular; to lay down the principles which should guide the revision of these working plans; and generally to advise the Conservator with regard to the management of the forests and the training and instruction of apprentices. In connection with the school it will be necessary to establish experimental plots of forest, which will be systematically subjected to different kinds of treatment and where meteorological and other observations will be made. A forest garden, and as already mentioned a library and museum must also be established, and these institutions will be specially under the supervision of the Board of Inspection. All important proposals regarding the arrangements for the theoretical instruction and practical training of apprentices should be submitted by the Director in the first instance to the Board of Inspectors. Their joint reports will be submitted to the Government of the North-Western Provinces, with whom it will rest to pass orders thereon or to submit them for the orders of the Government of India.

If these inspections are made in the manner here suggested, they need not take up more than a few weeks each year, nor could the officers in question be spared from their own duties for a longer period.

45. The selection of apprentices to be sent to the forest school must be left to the Conservators of the different provinces, for it is intended that as a rule they shall, after completing their course of instruction, return for service in the province where they were selected. It will be necessary to fix upon a minimum standard of general education such that they may be enabled to

profit by the course of instruction at the school. This for the present may probably be laid down as follows:—

(i) Ability to read fluently and write correctly their own language.

(ii) Arithmetic, including vulgar and decimal fractions.

(iii) A good knowledge of vernacular accounts.

It is hoped that the course of instruction at the school may result in apprentices pursuing their mathematical studies as far as the first book of Euclid and Quadratic Equations.

A good constitution and active habits will, as a matter of course, be regarded as indispensable by all Conservators sending apprentices to the school, and it will be useful if Conservators could give them a previous trial in actual work for at least six months, so as to satisfy themselves whether the candidate is likely to be useful as a Forest Officer. All candidates before being admitted to the school should be required to undergo a strict medical examination by the Civil Surgeon of the station nearest to their place of residence.

I do not suggest that a knowledge of English should be required; but most candidates sent will probably have some knowledge of it.

The limits of age should be 18 to 25.

46. Before proceeding further, it will be useful to state that the use of the forest school by Conservators should be entirely permissive. Conservators should in no way be required to send apprentices to the school. If they have the means in their own province for giving them the needful professional training, there will be no necessity for their sending them to the school proposed to be formed. Indeed, during the first few years, and until the management of the school forests has been brought to a certain state of perfection, it will be preferable to have only a small number of apprentices to educate.

47. In some cases, candidates may be able to defray the expenses of their course of instruction themselves; and, in order to facilitate this, no fees should be charged in the beginning. In other cases Conservators may enable promising youths to study by giving them a small monthly allowance by way of an advance to be recovered from them by periodical instalments afterwards, which should not exceed 50 per cent. of their pay; no interest being charged.

This arrangement, however, may not be possible in all provinces; it will therefore be desirable for Government to establish a limited number of scholarships. After consulting Conservators of Forests and considering all circumstances, I have come to the conclusion that an allowance of Rs. 15 per mensem should be attached to each scholarship. It has above been explained that, for many years to come, ten candidates annually will be the maximum number that can be expected to join the forest school. The course of instruction will, ordinarily, be for two years; therefore it cannot be expected that more than twenty apprentices will at one time be under tuition; and for many years the number will probably be much smaller. Under these circumstances, it will suffice to sanction eight scholarships as a commencement, which will entail an annual outlay of Rs. 1,440. No scholarship should be held by one man for more than two years, unless any student shews a special aptitude for topographical survey, in which case he may, on the recommendation of the Director of the Forest School, be permitted to remain for another year and continue to draw the scholarship in order to enable him to pass by the higher standard in surveying.

48. A just and fair distribution of these scholarships to applicants will require the consideration of many circumstances. Candidates from the more distant provinces, for instance, such as Mysore and Burma, who will require to learn Hindustáni or English in order to be admitted to the school, will find it more difficult to come to North-West India for instruction, and should therefore have a certain preference in the distribution of scholarships. Under these circumstances, it will be necessary that the grant of scholarships should be vested in one officer; and it appears the most convenient arrangement to entrust the Inspector General of Forests with this duty.

49. The date of admission of apprentices should be the 1st June and none should be permitted to enter on any other date. In very exceptional cases, a representation might be made, but the Government of India alone should make exceptions.

The months of June, July, August, and September of the first year would be devoted to work in the office and to theoretical instruction. During the eight months following, the apprentices would be employed in the forests or in the field with a party of the forest survey. Another four months of theoretical instruction would commence the second year and the entire course of training would be closed by a second period of eight months in the forest or with a survey party.

50. The arrangement of the work during these four periods of their training must be left to the Director; it will suffice to say that the following will be regarded as the chief subjects of instruction and practical training, and to explain what relative importance should be assigned to each in the final certificate to be granted to the apprentice.

At the outset I am inclined to recommend the adoption of one standard only, and that successful candidates should at the close of their training obtain what should be called the Forest Ranger's certificate.

51. It will be convenient at the beginning to fix the maximum number of marks to be obtained at 1,000; and to stipulate that the Forest Ranger's certificate should not be given unless ½ of the aggregate marks as well as ½ of the marks assigned to forestry and surveying has been obtained. Of the maximum number 700 marks might be assigned to forestry and 200 marks to surveying. To these subjects it will be necessary to add instruction in mathematics and mensuration, to which 100 marks may be assigned.

52. A few years hence, when arrangements for teaching these subjects can be made, the elements of botany, meteorology, a knowledge of rocks and soils and the rudiments of law should be added. To each of these subjects 50 marks may be allotted, so that eventually the total number of marks would be 1,200; the number assigned to each subject being as follows:—

1.	Forestry ...	Practical	500
		Theoretical	200
2.	Mathematics ...	... ...	100
3.	Surveying ...	... ...	200
4.	Botany ...	... ...	50
5.	Rocks and soils	... ...	50
6.	Meteorology ...	... ...	50
7.	Law ...	... ...	50
		TOTAL ...	1,200

The extension of the course of instruction here suggested must be effected gradually and should not be attempted unless it is evident that the apprentices are sufficiently well educated to profit by such instruction, and that their time will not be wasted by teaching them a large number of subjects. At first all instruction must be limited to forestry, surveying and mathematics. The chief aim of the Forest school must be to teach little but to teach it thoroughly.

53. The instruction in forestry will be chiefly of a practical character, for forest management in India is not yet sufficiently advanced to admit of a satisfactory treatment otherwise. As a matter of course, apprentices must learn during their time of apprenticeship the classification of forests and the main principles which regulate their management. For this purpose it will be necessary to devote a considerable portion of the eight months assigned to theoretical instruction to a course of lessons or lectures on elementary forestry, and the following schedule will serve to indicate the range of subjects to be treated in this course. It must be understood that nothing more is intended than to impart a good knowledge of a few fundamental facts and principles:—.

1.—*Influence of rocks and soils and climate on forest vegetation.*

2.—*Classification of forests.*—Evergreen, deciduous; pure, mixed; high forest, coppice, coppice under standards.

3.—*Different classes of forest produce, their properties and uses.*

Timber.—Structure, weight and mechanical properties, seasoning, decay, destruction by insects, chief uses of timber, structure of palms, rattans and bamboos. *Fuel*—heating power, products resulting from the combustion of wood, carbonic acid, ashes. *Charcoal*—principles and secondary products of the manufacture of charcoal. *Fibres*, gums, caoutchouc, resins and other exudations. *Bark*, leaves, flowers, fruits, seeds. *Lac*, honey, wax and other produce of insects in forests.

4.—*Mode of growth and requirements of different trees.*

General.—Functions of roots and leaves, flowers, seeds, germination, periods of growth, wood, bark, annual rings; influence of light and shade on the growth of different species.

Special.—Mode of growth and requirements of the principal species, deodar, sâl, teak, sissoo, kikar.

5.—*Treatment of forests.*—Thinning, cutting by selection, cutting by compartments, natural and artificial reproduction, injury by creepers and fires and protection from them, valuation surveys, annual plans of operations, preliminary working plans, regular working plans.

54. Of the 700 marks assigned to forestry 200 may be allotted to theoretical and 500 to practical instruction. As already explained, the greater part of the two field seasons of eight months each will be assigned to practical instruction in forestry, and the arrangement of this instruction may be illustrated by the following suggestions which must of course be modified according to circumstances. During the first field season a few apprentices would be placed, say, for four months under the charge of the Chakrata officer, and, during the remainder, under the charge of the Dehra Dún officer. The Director would instruct these officers how to employ the apprentices, and it would be understood that though their work must be varied, yet that they should be employed on each kind of work long enough to master it thoroughly. At the end of the time assigned, the divisional officer would submit a report under three heads: *first*, general conduct and diligence; *second*, aptitude for the work of a forest officer; and *third*, knowledge acquired which should be tested by periodical oral examinations to be held, if possible, in the presence of the Director.

55. A similar report would be submitted by the officer in charge of the forest survey party under whom the apprentices would be placed to learn surveying.

During the entire course of instruction, there would probably be three reports from three different divisional officers regarding the progress of the candidates in forestry, and one report from the survey officer; and on the ground of these reports the Director would find no difficulty in determining the number of marks to be assigned to each apprentice.

56. The instruction in mathematics should comprise everything that relates to the measurement of timber, wood and standing trees and generally the measurement of planes and solids, excavations and embankments. In addition to arithmetic it will be desirable to insist upon a knowledge of elementary algebra, and an attempt should be made to bring up the students to quadratic equations and to give them a knowledge of the elements of geometry, as far as they are contained in the first book of Euclid. How much time should be assigned to mathematical instruction must be determined after actual experience, but it will probably be best to give instruction in mathematics throughout the two seasons assigned to theoretical instruction in the summer months. The examinations upon which the marks earned in this branch should be based should, like the examinations in forestry, as much as possible, be *oral* and should be held periodically during the four summer months.

57. It has not yet been stated how the teachers in theoretical forestry and mathematics are to be provided. If, as is here proposed, the Conservator has a staff of 7 officers at his disposal in addition to the 3 officers who will do the work of the Forest Survey Department, he will be able to arrange to have two of his staff at head quarters during the four summer months, which have been assigned to theoretical studies, and in selecting the officers to be posted

to the forest school, care must be taken to select men who are capable of teaching the elements of forestry and mathematics to the point required. The instruction in forestry must, as a matter of course, be given by a professionally trained Forester, and it will be an advantage if mathematics also are taught by a Forest Officer, for he will be able to give a practical turn to his teaching.

58. It is not intended to give any special allowance to the officers entrusted with the practical training of the apprentices in the forest or in the field; but theoretical instruction is quite a different task, which requires special qualifications on the part of the officers selected, and it is for consideration whether it will not be proper to grant a small local allowance for the performance of these duties during the months assigned to instruction at head quarters. This work will be undertaken by the officers selected in addition to their duties as Forest Officers, and it is desirable that they should undertake it willingly and with pleasure. It would, however, be premature to submit definite proposals on this subject at present.

59. The remaining branches of instruction which it is proposed to include, not at first, as already explained, but eventually; are the elements of law, of botany, a knowledge of rocks and soils and meteorology. It will probably be most convenient to assign two out of the eight summer months available to each of these subjects; and it may be convenient at once to mention the text-books which may be used. These text-books are—

1*st.*—Oliver's First Book of Indian Botany.

2*nd.*—Page's Introductory Text-book of Geology.

3*rd.*—Blanford's Rudiments of Physical Geography for Indian Schools.

For the elements of law no text-book can at present be recommended. To each of these 4 subjects a maximum of 50 marks may be assigned, so that eventually the total maximum number of marks will be 1,200.

The certificate should specify the number of marks earned by each apprentice.

60. In case of misconduct it must rest with the Director to dismiss any apprentice without reference to higher authority, and a man thus dismissed should not afterwards again be admitted to the forest school. The Director would immediately inform the Conservator by whom the apprentice was sent.

61. Candidates who have obtained the certificate should be entitled to an appointment as Forester on pay not less than Rs. 20 per mensem, within three months from the date of the certificate. As a rule, these appointments would be given in the province from which the apprentices are sent; but apprentices should be made to understand that in the event of there being no vacancies in that province they may be required to commence their service in another province, the circumstances of the case being duly taken into consideration.

62. In the case of all apprentices who receive an advance or scholarship during their course of instruction, it will be convenient that they shall sign a covenant and give security, engaging to serve in the Forest Department for five years after their appointment.

63. In addition to the apprentices which it is proposed should be prepared for the appointment of Forest Ranger, it will probably be found convenient in future to post Sub-Assistant Conservators appointed in this country and trained Forest Officers arriving from England to the forests attached to the forest school, so as to give them facilities for learning the language and some of the peculiarities of forest management in India. With a strong staff of professionally trained officers, it is hoped that rapid progress will be made in perfecting the management of these forests, and that the time spent in them will be useful as a preparation for their work in other provinces. The suggestion to utilize the forest school in this manner relates only to officers posted to those provinces in which Hindustáni is one of the compulsory languages.

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64. It is also expected that in future some of the men who have attained the Forest Ranger's certificate will desire to continue their studies at the school so as to attain a higher certificate qualifying for employment in the superior staff. It has already been said that in such cases the scholarship may be continued for an additional year, but it would be premature at present to detail the further arrangements to be made to attain this object.

65. The additional burden that will be imposed upon the Imperial revenues by the establishment of the forest school, as here proposed, will consist of the following items:—

I.—One Deputy Conservator on Rs. 500 per mensem, making an outlay of Rs. 6,000 per annum on account of pay, and, about Rs. 1,200 for travelling allowance, total Rs. 7,200.

II.—Eight scholarships on Rs. 15 per mensem at a total annual cost of Rs. 1,140.

III.—Additional office establishments on account of the additional divisions which must be formed, which may be estimated at Rs. 200 per mensem or Rs. 2,400 annually.

IV.—Three additional Forest Rangers, the cost of which may, as explained, above, be estimated at Rs. 200 per mensem or Rs. 2,400 annually.

V—Purchase of a house at Dehra Dún for the forest school and the Conservator's office at a cost not exceeding Rs. 25,000, representing at 8 per cent, including interest, repairs and deterioration of capital value, an annual outlay not exceeding Rs. 2,000.

The aggregate annual outlay may thus be estimated as follows:

	Rs.
I—One Deputy Conservator	7,200
II.—Scholarships	1,440
III.—Additional office establishment	2,400
IV.—Additional Forest Rangers	2,400
V.—House	2,000
TOTAL ...	15,440

But this amount will only gradually be worked up to. It will not be possible at once to appoint all additional Forest Rangers proposed, as competent men will not be immediately available, and it is probable that only a small proportion of the scholarships will be filled during the first few years.

66. The present proposals are based upon the assumption that there will be only two Conservators in Oudh and the North-Western Provinces, and that on the appointment of a separate Conservator for the forests assigned to the school, one of the other Conservatorships will be abolished. This however can only be effected when a vacancy arises among Conservators, and until then it will be necessary to keep open the first grade Deputy Conservatorship at present held by Captain Bailey. This will reduce the outlay on this account to the amount required to bring up Captain Bailey's pay to Rs. 1,000, the pay of the lowest grade of Conservator, Rs. 1,000 —900=100 per mensem, equal to Rs. 1,200 per annum, and the difference in the travelling allowance of a Conservator and Deputy Conservator, which, at one rupee per diem, may be estimated at Rs. 240 annually. This temporary outlay of Rs. 1,440 annually will cease before the outlay estimated in paragraph 65 will have been fully worked up to.

Until the supernumerary Conservator is abolished, it will also be necessary to entertain as a temporary measure a small office establishment for the Conservator in charge of the school forests.

The purchase money of a house must be provided during the first year, and in addition to this it will suffice if the sum of Rs. 15,000 is added under B (Establishments), to the forest budget of the North-Western Provinces on account of the forest school. A proportion of the expenditure here proposed will be covered by abolishing the system of apprentices sanctioned in 1871. The cost of this measure was Rs. 390 per mensem, and Rs. 4,680 per annum, and the apprentices now actually entertained in the different provinces cost Rs. 280 per mensem and Rs. 3,360 per annum. It is not desirable to abolish this system at once, but after the forest school has been established it will doubtless be discontinued, and thus a considerable saving will be effected.

67. The additional outlay here estimated will within a few years be covered by the increased net revenue produced by the forests in question under a stronger staff and more systematic management which will be attained by the closer supervision exercised by a Conservator who will have the control of five forest divisions only, not to mention the increased capital value and future productiveness of the forests and the incalculable benefit which forest administration in all provinces will derive from the arrangements made to furnish them with a regular supply of professionally trained Executive Forest Officers. It may be truly said that the commencement of real and steady progress in Indian forest administration dates from the appointment in larger numbers of professionally trained Forest Officers. Hitherto, the superior officers only have had the advantage of professional education. A new era of forestry will commence, and a new impulse will be given to progress by the professional education of Forest Rangers and Foresters.

68. The proposals of the present report are limited to the provinces under the Government of India. None of the suggestions submitted relate to the Presidencies of Madras and Bombay. Should, however, the Governments of Madras or Bombay desire it, arrangements could doubtless be made to admit a limited number of apprentices, sent for professional instruction by any of the Conservators of those Presidencies. No such extension of the original scheme should, however, be attempted until the forests attached to the school have been placed under a thoroughly efficient system of management and until the institution is in good working order in all its branches.

APPENDIX.

FORMATION OF A TRAINING SCHOOL FOR NATIVE FORESTERS AND FOREST RANGERS.

Minute by the Lieutenant-Governor of Bengal, dated 9th October 1876.

THE expansion within the last two years of the Forest Department in the provinces under the Government of Bengal, and the employment of so large a number of Native officials in the business of forestry, render it desirable that some steps should be taken for the establishment of a training school in one or other of the Government forests. The total area of the Government reserved forests taken up under the Forest Act in these provinces amounts to about 3,300 square miles; and the number of Native officials who are employed in these forest tracts, scattered over so many districts, can hardly be less than fifty at the present time, and will, within a very few years, be one hundred. The salaries range at present from Rs. 20 to Rs. 100 per mensem, but there exists sanction for raising the pay to Rs. 150, as soon as men shall become duly qualified. And the departmental organisation provides that a Native may rise to be Sub-Assistant Conservator on Rs. 200 per mensem, and ultimately, in case of special merit, to the graded service beginning with a salary of Rs. 250. The work is well suited to the Natives of these provinces—better suited to them perhaps, for climatic reasons, than to Europeans. But if it is to be performed with real efficiency, the men must receive a special training at the outset: the business constitutes a profession, and those who undertake it must receive a professional preparation.

This preparation manifestly ought to be of two kinds: first, scientific, relating to botany; second, practical, relating to forestry. It will naturally be a part of the duty of the Conservator of Forests and of his Assistants to select young Natives from the Government schools and colleges for his Department, and to see that they duly receive a training as specified above. The arrangement of the details of the plan may well be left to him; and I am sure that his best efforts will be exerted for the attainment of the object in view. It is sufficient for me to indicate the main principles only.

The Conservator then would engage young Natives upon such salaries within the sanctioned scale as may seem proper: this engagement would be provisional, and subject to the passing ultimately of the professional tests. He would prescribe some preliminary test of general education in reading and writing, and the like; also in surveying with compass and chain, for which pursuit our schools afford already adequate facilities. After the provisional admission of the candidates, he would see that they are subjected to instruction in botany and in forestry.

I should attach much importance to their being fairly well-grounded in the elements of botany as a science, both systematic and physiological. No very high standard in this respect need be attempted. Still the young men ought, at the outset, to acquire a competent knowledge of the structure and functions of plants. Again, though they need not learn all the minutiæ of systematic botany, still they ought to understand the leading principles of the classification of plants, and the reasons why those principles have been adopted by the schools of botany in Europe. They ought to know the names of the principal natural orders of plants, and the several groups in which those orders have been arranged. And all this knowledge should be acquired not only by the reading of elementary books and the hearing of lectures, but by the actual dissection of plants with their own hands. The handling and dissecting of plants by the students themselves is an essential of primary importance. The Botanical Gardens at Calcutta, and the arrangements there made for the instruction of students of the Medical College, would afford every facility for instructing simultaneously the candidates for the Forest Department. In that case there would be an examination at the end of the course of instruction, and the candidates would receive a certificate from the Superintendent of the Gardens. At some of the other colleges also there is some botanical instruction afforded, and perhaps the Conservator might find it sufficient to accept certificates of proficiency in botany as accorded by the college authorities. Or, ultimately, he might prefer to make his own arrangements departmentally for such instruction. But in the beginning he will probably find it easier and cheaper to make use of the means already existing in the Educational or the Botanical Department.

The Conservator would then select one or more of the Government reserved forests wherein to afford to the young men that practical instruction in the work of forestry which is to form the business of their lives. In such a place they will see the application of the elementary scientific knowledge which they have presumably acquired already. They will carry that knowledge farther and farther in respect to the trees and plants with which they are specially to deal. They will learn the best methods of clearing, of preserving, of lopping, of thinning, of cutting, of planting, of stacking, of preparing for market, and the like. The Conservator would fix the period during which such training should last. After its completion, there should be an examination, and a formal certificate should be given to the men as they pass. The granting of such certificate is important, and its precise form should be prepared by the Conservator and sanctioned by Government.

All young men thus passed must be permanently employed in the Forest Department under such terms as regards period of engagement, and the like, as the Conservator might settle. And no men, save those thus passed, should be employed in future.

It may happen, of course, that men thus passed may occasionally obtain employment under the civil officers in those districts where there are forests under the care of the ordinary local authorities. There would be no objection to such arrangements, inasmuch as the State has an interest in the preservation of those forests also.

The selection of the particular forest or forests for this training may well be entrusted to the Conservator. I understand that he may be disposed to select the Buxa reserved forest, which is situated immediately below the cantonment, and which is the best of the forests in the Bhutan Duars. Doubtless, this place would be well suited for the purpose. Perhaps other places may also be found suitable, especially if it be found desirable to give the students some varied experience.

These proposals are intended for all forest officials, foresters, and rangers below the grade of Sub-Assistant Conservator. If any of them should desire to resort to any higher school of forestry, which may be established by the Government of India, that will be very well; and with the approval of the Government of India, we might devise some means of sending a limited number of our best and most promising men to such an institution, if the Government of India should hereafter be pleased to admit them.

RICHARD TEMPLE.

Govt. Central Branch Press, Simla,—No. 608 R., A. & C.,—27-9-77.—400.